THE UNIVERSITY OF CHICAGO

A Human Reaction: The A/Criticality of Lay Space Expansionism

By Alaina Lykins

August 2025

A paper submitted in partial fulfillment of the requirements for the Master of Arts degree in the Master of Arts Program in the Social Sciences

Thesis Advisor: Dr. Damien Bright

Academic Preceptor: Dr. Mary Elena Wilhoit

Table of Contents

Acknowledgements

*For **J.A.** – for everything since ’01, too much to say*

*For **RK66** – for every krill and Wonton night*

*To **Dr. Bright** – for your vision of my research, from the beginning better than my own, and your invaluable help in getting it there*

*To **Dr. Wilhoit** – for more-than-humans everywhere, microbes, meerkats and mushrooms alike, and for all the theory you’ve made make sense*

And a few more:

*To **G.G.H.** – “yeehaw!”*

*To **C.J.C.** – you do us Earthlings proud*

*And for **V.G. & Co.** – my star, my perfect silence*

I. INTRODUCTION

For us Earthlings, going to outer space is never merely about outer space. Just as science fiction captures exploration of the contemporary anxieties of an author's culture, excursions from the Pale Blue Dot are arguably moreso about Earth – about what informational resources can be brought back, about what can be gained planetside by reaching that starry "new ocean" in a particular way, and about being *seen* as able to go. Viewed this way, space expansion is a very Earth-centric, precisely an anthropocentric, concept and practice. This has been true since the outset of the First Space Age (cf. Young in Rubenstein 2022, 153). During his landmark address at Rice University in 1962, US president John F. Kennedy outlined the nation's daring goal for the decade: "We choose to go to the Moon in this decade […] not because [it is] easy, but because [it is] hard" (Kennedy 1962). But Kennedy was no space enthusiast – rather, he thought the "impressive [expense]" of a successful American lunar landing and return, replete with patriotic symbolism at each turn, could resurrect the reputation of the US on the world stage, recently humiliated as it was by the Soviet achievement of first human spaceflight (Muir-Harmony 2020, 7; Launius 2003, 172). Global geopolitics has shifted much in the past six decades, as have the relevant technologies and the number of agents with the wealth and resources to wield such tech. Since the advent of the commercial space age, or NewSpace, around 2010, the number of objects launched into space has increased by more than ten times late-2000s averages, with much of that exponential growth occurring in just the past five years (UNOOSA 2025). The United States was responsible for about 80% of the objects launched into space in 2024, with no real competition by volume per registered figures (ibid).

So, just as preparations for a spacefaring future are well underway, so too are many of the technologies that power daily life in the West (e.g. GPS, satellite imaging, weather prediction)

made increasingly reliant upon space-based infrastructure. And ventures in outer space technology have increased in popularity multiple times over in the past two decades or so, as both cause and product of the recent commercialization of the space industry (Vance 2023, 340-41). However, as Schwartz et al. note in the introduction to their edited volume *Reclaiming Space: Progressive and Multicultural Visions of Space Exploration,* "there are as many motivations to advance space development as there are people on the planet" (2023, xii). Space is in the eye of the beholder, these authors write (1), and so there exist many ways to categorize and understand human desires to expand into space. How is it, therefore, that people are thinking about space? How are the grand narratives championing space expansion being received? Are those questioning such narratives gaining ground by seeding healthy skepticism, or are their criticisms swept aside, doomed to Cassandra's curse? Space expansionism, the mode most relevant to the study at hand, is characterized by an ambitious enthusiasm for humanity to live and work in space, an orientation prevalent among space experts (Deudney 2020, 23; Weinersmith 2023, 400). But while an adequate treatment of alternative space imaginings is beyond the scope of this project, space expansionism by no means represents everybody.

For example, Afrofuturism, the disruptive subgenre of speculative fiction that addresses Black communities' concerns – often projected into a technologically augmented, futuristic setting – offers a worldview which dissects and reorders structures of power, including expansionism (Symes 2022, 2, 10). In characterizing "space racism," scholar Aliyah Symes writes that seminal Afrofuturist texts "suggest alternative modes of living and being that posit a more ethical and empathetic means of entering [space], ones that don't privilege profit over people" (ii). Indigenous Futurism provides a similarly liberatory mode of radical imagination, taking concepts and inspiration from Native cultures to, in the words of Anishinaabe scholar Grace Dillon, "[return] to

ourselves" after the Native Apocalypse of European colonization (2012, 10). These intellectual and artistic realms do indispensable work in broadening future horizons, disconnecting space from the voracious (neo)colonial appetites which often seem poised to engulf it, but in this research cannot be explored with the thoroughness they are due.

What my research asks, then, is how people who may be termed 'lay' space expansionists – following the model defined by Daniel Deudney (2020) but as formulated by the public, not professional experts or policymakers – think critically *and especially uncritically* about space futures. I aim to study, in essence, how people who may be affected by space activity policies but do not have an active stake in driving policy to a certain conclusion (i.e., no direct financial or professional gains guiding their thoughts or actions) conceptualize the goals of contemporary space expansion industries. My focus is on the reception of space expansionist thought in the United States, as different regions of the world necessarily have different historical experiences and ideological approaches to questions about space (Marino 2024, 710). The goal of this project is to understand how interested non-experts, selected for their paid patronage to a science museum's space exhibit, engage with outer space narratives/information to construct moral opinions, hopes, and predictions about human space expansion. What do respondents think about space futures, and what do they want (and not want) to see? How is it they came by those opinions, and how do these opinions map onto and interact with the reality of space activity? Probing with greater depth than extant public opinion polls have facilitated, I am interested in finding out how and why people come to support space expansionism, and what kinds of questions they believe (ir)relevant to answer about the futures they envision.

To answer these questions, this paper will move through five sections. The first section will review extant literature on the most acritical forms of support for space expansion, giving a solid

foundation for what to expect from a traditional space expansionist mindset. The second section explicates the methods of data collection and analysis before the third section, which reports those findings in detail. This penultimate section is broken down into its own four parts: I first contextualize the data collection space, then characterize the participants whose thoughts serve as my data, and next explore their views about humanity and our tendencies and prospects before investigating the relationship of lay beliefs and hopes to space expansionism, showing what futures people do, and do not, find favorable. Since the lay museum audiences with whom I worked provided insight into both their hopes *and* concerns, both their acritical support for space expansion and their criticality of this concept will be treated. Finally, the last section contains a concluding summary of my results, including limitations of the present study and questions for future research.

This study of the a/criticality of space expansionism thus contributes to discussions surrounding the role of outer space and what it means to us, examining more specifically what laypeople suppose, want, expect, and are willing or unwilling to accept about a future where humans expand into space. I choose to focus on this "lay" or bottom-up perspective in order to engage extant literature from a different angle by 1) showing what work broader narratives and understandings of space do unto individuals and 2) problematizing the underexplained claim to the "full speed ahead" acriticality found in many descriptions of space expansion enthusiast communities. In so doing, I answer the call of the Equity, Diversity, and Inclusion Working Group who wrote the October 2020 white paper *Ethical Exploration and the Role of Planetary Protection in Disrupting Colonial Practices*, which asserts the dire need for interdisciplinary collaboration in formulating ethical planetary protection policies, including perspectives of everyday people (Tavares et al. 2020, 1-2). While the prospect of living and working in space is still far off, the time to build the foundational social frameworks for that likely eventuality, without merely using a

techno-utopian hallucination as a crutch, is now. Therefore, most broadly, I hope this project will help us understand better how to approach spacefaring in a way that avoids, with forethought and intention, an aggravation and/or repetition of Earth's anthropogenic disasters and the posing of an existential threat to our home planet.

II. RESEARCH ORIENTATION

Most broadly, my research questions seek to further understandings of the interplay between how we structure and interpret society, and how we imagine likely and/or ideal futures in relation to the present. The eponymous twin engines of the field of science and technology studies (STS) power much of Western life and self-conception in the era of modernity (Jasanoff & Kim 2015, 9). STS scholars analyze the connective tissue that fundamentally rejects surface-level designations of the unfeeling machine to explore the social meanings and agencies of science and technology. For example, Haraway teaches us that this combination of imagination and material reality is ubiquitous in the modern world, the centrality of the hybrid "cyborg" owing to the collapse of the boundaries between human and animal, organism and machine, and physical and nonphysical (2016, 7, 10-12). Just four years before the first publication of Haraway's *A Cyborg Manifesto*, STS titan Bruno Latour wrote in his 1981 essay of "drawing things together," interrogating the dual material-mental capacity of inscriptions, like numerical graphs or scaled maps, as "immutable mobiles" which explain scientific progress (3-4). The influence and longevity of the information stored and transmitted via such inscriptions allows for "recombination" (19) of diverse and disparate ideas across cognitive, social, and institutional divides (30), helping to erase arbitrary boundaries that might otherwise keep what we might consider unlike data apart (e.g., geology and sociology (Starkey 2021)). However, the sheer proliferation of scientific and technological materials in the modern era can quickly become

overcomplicated and unwieldy, as with Latour's astronomer so consumed with enlarged and refined segments of chromatographs that she never looks at the sky (1981, 16). To address this issue of scope, in Haraway's hands, the magnifying glass is angled to focus an inflammatory point of light on speculative feminist theory and praxis, searching for the form(s) of political accountability capable of bridging "the scientific-technical hierarchies separating us" (2016, 45). These scholars' work is connected to that of those studying space technology more particularly, as this preoccupation with the role of imaginaries in how we see and make the world is necessarily shot through speculative configurations of space futures.

In their book *Dreamscapes of Modernity* (2015), Jasanoff and Kim utilize the concept of "coproduction," or the simultaneously constructive ways in which we "know and represent the world" and how we "choose to live in it" (Jasanoff 2004 in 2015, 3), to study what they call "sociotechnical imaginaries" (4). These imaginaries they define as "collectively held and performed visions of desirable futures," or resistance against undesirable ones (18). Such mental models are made salient and agentive by the cultural understandings we share of the possibilities for social organization systems that both rest upon and further scientific and technological advancements (ibid). Sociotechnical imaginaries are important to understand because they inform us about moral as well as observational visions of the world: how it is, but also how it should and should not be (4, 13, 21). For example, in analyzing the earliest satellite surveillance system the US employed against the Soviet Union, Joseph Masco determined that the technology of the Corona camera satellite represented a "missed opportunity" for self-reflection of the death-obsessed US military industrial complex (2012, 1120). Though the Corona photographs provided evidence that the Soviet missile capacity had been severely overestimated by expert US military opinion, they were kept classified for over three decades, thus insulating military paranoia from

critique and allowing Americans' morbid ideas of what *was* – a world on the brink of war – and what *should be* – a US prepared to win, as much as victory in nuclear war exists – to continue to coexist (ibid, 1117). More disruptive imaginaries than this are required to break free of the trap Masco and others identify along these lines; namely, how we are meant to imagine a world without end (1122; Haraway 2016, 7). As Klimburg-Witjes notes, outer space is an inviting backdrop against which to envisage such imaginaries (2024, 565), however, as she warns, there is a balance to be struck between projecting a utopia into the stars (what should be) and writing the Earth (what is) off completely with no plan for what lies between.

The intellectual bequests of STS matter to my study because they preface the deep and undivorceable connection between technoscience and the modes and visions by which we imagine the future. Especially as it pertains to outer space, a place where our every interaction with the environment is by necessity technologically mediated, we must ask: how is it that the pervasiveness of science and technology in our cultural consciousness influences our hopes and predictions? To help answer this, Klimburg-Witjes (2024) argues for the growing salience of the nascent field of Social Studies of Outer Space (SSOS) as a distinct discipline within STS, following Latour to draw together expertise from many other social sciences to study concepts such as modes of knowing and place-making (563), imaginaries at the core of NewSpace (565), and (post)coloniality of social and environmental relations (566-67) in the specific context of outer space. She finds SSOS to be uniquely equipped to critically analyze the technoscience of outer space, and how it serves as a site of the "imagined sociotechnical futures" (562) about which Jasanoff and Kim write. Marino (2024) proves the worth of such claims: for example, she reveals the ways in which space entrepreneurs' "exit narratives" (697) prefacing human colonization of space disincentivize critical engagement with the colonial legacies of occupation, dispossession,

and pollutive extraction which underpin the foundations of space activity of all kinds (700). She cautions against the techno-utopian bent in Morozov's (2013) concept of "solutionism," or the idea that complex, structural problems like social inequality should be addressed with technical means (710), useful here to contextualize the techno-optimist element of space expansionism. She concludes by asking how the future can be reimagined to temper uncritical "faith in technocratic forms of progress" (711). This task is a collective one, since imaginaries are by no means the sole property of the state or other elite structures' representatives (Jasanoff 2015, 24).

Turning now to but one such imaginary, space expansionism is, first and foremost, a belief that 1) humans should develop the technology to become spacefaring, and 2) doing so will not only improve life on Earth but make possible favorable extraterrestrial settlement elsewhere in the universe. Political scientist Daniel Deudney's *Dark Skies* (2020) provides the basis for "space expansionism" as many scholars have recently characterized it (e.g., Garretson & Goswami 2020, xvii); it is his definition I will use, while also incorporating De Witt Douglas Kilgore's conception of astrofuturism (2003, 11). Deudney defines space expansionism as an "intoxicating ideology" wherein techno-optimism rules the future (2020, 14). It is a subset of technological futurism, lent credibility by the exponential growth in science-based technology in the past two centuries (8-10, 111). Deudney divides space expansion into three main types (30). First is habitat expansionism, or living and working in space/on other planets to first solve Earth habitability problems and later become multiplanetary. Second is military expansionism, the most competitive of the three, having to do with the proliferation of weapons in space toward the end of national security on Earth. Lastly, planetary security expansionism is a more restrained mode than the previous two which prioritizes regulation and cooperation; exploration is the main activity in this program. Space expansionists do not all agree on what the most desirable or dangerous outcomes are (29), but they

do agree that expansion promises to solve Earthly problems imposed by planetary limits (11-12). *Dark Skies'* central assertion is that space expansionism presents an existential threat to humanity, and that its "ambitious core projects…should be explicitly relinquished" (7). Deudney comes to this conclusion through examining those potentialities and historical events which space expansionists tend to ignore or downplay (e.g., Skran 2024, 9-10, 74-82), like the heretofore unimaginable scope of interplanetary warfare (Deudney 2020, 149), the likelihood of totalitarian government (136), and the reality that most of our space activities so far have been explicitly for or stemmed from military applications (56). In so arguing, he takes a position against many other prominent space figures, even those scholars who agree with him on some points. For example, astrobiologist Ian Crawford (2022, 8) believes humanity is not currently ready for space expansion under an anarchic state government system, but argues that the development of a strong federal world-interplanetary government would mitigate the age of calamity Deudney predicts (14).

Despite the technologically novel forms space expansion is taking in the 21st century, space expansion*ism* is not a new ideology. The first engineered craft which carried humans to space launched in the 1960s, as part of the costly signaling strategy for national prestige and domination between the USA and Soviet Union. In these olden days, a few whole governments were the only social entities capable of marshaling the labor and resources to reach outer space. However, a clear acceleration in both interest in and ability to access space can be documented since the 2010s. This "NewSpace," in contrast to the just-described "Old Space," is chiefly characterized by the privatization of the space industry, resulting from the Obama administration's cancellation of the planned Constellation program and subsequent allowance for the entrance of the competitive private sector into what was once the sole domain of public governmental entities like NASA (Rubenstein 2022, 85; Shammas & Holen 2019, 2). However, despite how Old Space is often

derided as outmoded, policy regarding space has not yet caught up with this fundamental shift. The primary law governing outer space activities, nicknamed the Outer Space Treaty (OST), was signed in 1967, and dealt with the concerns of the time. The OST professes a belief in outer space as *res communis* – a shared commons, attractive to the *collective* imagination not least due to their shrinking on Earth (Caffentzis & Federici 2014, i95) – and prevents sovereign *state* claims to territory on celestial bodies, but its ambiguities allow for private capitalist incursion (Shammas & Holen 2019, 2; Rubenstein 2022, 100-01). Many with their gazes turned to outer space excitedly anticipate NewSpace, as space enthusiasts embrace the rapidity and risk of private enterprise over the bureaucracy and relative slowness of the Old Space days. This evokes questions regarding how public support will allow prominent and powerful space barons to design or strongarm their own policies and procedures (Rubenstein 2022, 24; Eriksson & Newlove-Eriksson 2023, 48).

Moving into the narratives which bolster the expansionist core of both Old and NewSpace (albeit depending upon subtype), as readers familiar with *Star Trek* will be aware, space expansionist rhetoric often positions outer space as the "final frontier," situating it as the latest place into which the American experiment must and will penetrate[1] (Newell 2014, 150; Deudney 2020, 206; cf. Olson 2019). This frontierism is crucial to Kilgore's conception of astrofuturism, which carries forward 19th-century Eurocentric ideas that "conquest and empire are the logical modus operandi of any progressive civilization" (2003, 11). Seen this way, the foundational ideological engine of manifest destiny chugs along on the metaphorical railroad, Western scientific advancement being another facet of the authoritative knowledge production that orders the world

[1] For example, Harvard Business Administration professor Matthew Weinzierl's recent work explicitly rests upon the foundation of this concept: in 2018, he published an article called "Space, the Final Economic Frontier," and just a few months ago he and co-author Brendan Rosseau released their book *Space to Grow: Unlocking the Final Economic Frontier*. Its opening sentence reads "Space is a place of unparalleled possibility for humanity, and it is in the midst of a revolution" (Weinzierl & Rosseau 2025, 11).

and dictates how humans should interact with it. Therefore, opening the frontier of outer space and transforming its resources into commodities for capitalist markets are taken as foregone conclusions. As critical space theorist Natalie Treviño writes, "[t]he American Cosmic Order produces and perpetuates state sanctioned violence and the violence of capitalism, because it requires an 'outside' to exploit and abuse as part of the colonial project of the Frontier" (2020, 61). Taken for granted alongside this is the USA's sense of superiority that is teleologically both causal to and reinforced by American-led space expansion; in other words, for an expanding empire, a frontier's inviting porosity both beckons pioneers forth and affirms their righteous cause once they have expanded. That striving to access whatever is beyond the frontier is a worthwhile goal is one of the USA's founding stories (Turner 1894). Some scholars disavow the American imperial experience in their conceptions of space expansion, theorizing about decolonial space futures instead (Rubenstein 2022, 7). However, when looking at those space expansionists who accept American exceptionalism and see merit in the USA being *the* dominant space power, this represents a striking locus of acriticality to be studied.

Querying space futures as extrapolated from contemporary concerns has long been the domain of science fiction earlier than of organizational reality, policy regulations often lagging behind imagination and innovation. But as recent developments in technology seemingly shorten the distance between Earth and outer space, debate over these questions, not least "should we go to space?" are entering mainstream academia. The realms of criticality currently being studied in the literature begin to center around a few key themes: the problematics of imperialism and colonization (Marshall 1995, Rubenstein 2022, Taylor 2022, Newell 2014), ethics and legal systems (Nesvold 2023, Barela 2023), governance and liberty (Cockell 2015, 2016), competition and capitalism (Shammas & Holen 2019, Goswami & Garretson 2020, cf. Nelson & Block 2018),

and conflict (Deudney 2020). Scholars such as these point out serious issues with the untenable sustainability, (extra)terrestrial coloniality, and ignorance/normalization of such problems with which NewSpace is thoroughly laden. However, as Eriksson and Newlove-Eriksson write of space activity since the 2010s, beyond a relatively small yet dedicated collection of authors, "[l]ittle to nothing is said about systems of governance and politics, how conflicts are to be handled, and how human rights are to be protected" (2023, 48). Similarly, as Erika Nesvold notes as one of the driving reasons behind her book *Off-Earth: Ethical Questions and Quandaries for Living in Outer Space*, there is an intellectual disconnect between the humanities-trained scholars thinking of such questions, and the STEM-trained workers in the space industry, mired in technical concerns (2023, vii-viii). Schwartz et al. locate a broader version of this disconnect between people who already work on space and the nonexpert public: these authors critique the insularity of what we can call "space spaces," arguing that space should benefit everyone, not just those interested in what is already happening there (2023, xii).

Scholars who frame space expansionism as a religion provide a compelling lens through which to begin interrogating the acriticality of the space expansionist faithful. Mary-Jane Rubenstein's (2022) book *Astrotopia* details the saturation of colonial Christian themes within space expansionist narratives of disaster and salvation, of the divinely ordained destiny of humankind (75), and of deliverance to the freedom of the stars from earthly problems by "astrosaviors" like Elon Musk (4). Looking also at the narratives which structure NewSpace enthusiasm, Sarah Taylor (2022) focuses on the 'new Earth' marketing of Musk's corporation SpaceX which "dilutes" the uncomfortable realities of Mars' inhospitableness and the consequences of extractivist colonization of the Red Planet, showing the direct connection between capitalist profit-seeking and utopian fantasies about space futures (68). Former NASA historian

Roger Launius coined the term "space gospel," using it to expand more explicitly on the mythical nature of human spaceflight and how the "deeply religious quality to advocacy for the investment in and support for human space exploration" explains public attachment to space programs (2013, 45). Investigating receptions of the same spiritual element of human spaceflight, Bjørnvig critiques the classic space expansionist text, Frank White's *Overview Effect* (1987), as fundamentally religious in nature, arguing that this has gone unnoticed by other scholars who treat it as a legitimate scientific work, thereby illustrating the degree to which religiosity has permeated the self-proclaimed atheistic and science-oriented movement (2013, 19). Lastly, Catherine Newell (2014) looks even further back in time to show how midcentury artistic renditions of outer space worlds "provided the evidence of the viability of this new frontier" to the eyes and imaginations of the American public, giving visual concreteness to the object of space expansionist faith (165). Even *Dark Skies'* introduction says that "space expansionism is in many ways a science-based and technology-dependent *religion*" (Deudney 2020, 13, emphasis added).

Despite important ideological continuities between NewSpace and Old, if nothing else, the mediatized novelty of recent developments in space expansion provide an opportunity to renew attention to lay understandings and expectations of what we do in outer space and why. It is urgently important to examine attitudes about American space presence not only because of the nation's track record and future capacities in space in military, commercial, and exploratory terms, but because of the ideological forces of ontological exceptionalism, frontierism, and "progress" toward exponential growth and greater control over the universe that drive the particular vehemence of American space expansion. Space expansionism in the US especially takes on a traditionalist bent in addition to its techno-futurism, in that it pulls from certain interpretations of the past to predict and legitimize a spacefaring future. Ordering stories about the human species,

such as that we have an indomitably adventurous spirit which will propel us 'out there' as a matter of our true nature (e.g., Sagan 1994, 230), or about the American nation, such as the frontier myth explored earlier, are foundational to American space expansionism. Space expansionist narratives which center the supposed inevitability of space settlement require these pasts to contextualize and justify themselves (Dark 2006). As Eriksson and Newlove-Eriksson argue, both American space policy and private astropreneurs adopt and deploy language that bolsters the "American space dream," demonstrating continuity with pre-NewSpace narratives that center America as the dominant global (space) power while also appealing to the American/global publics for support (2023, 56). Simpson et al. also draw attention to the endurance of capitalism when considering space futures, as neocolonial models of space resource exploitation and the exportation of private property and economy to outer space are often accepted by space enthusiasts as part and parcel of human expansion (2024, 5).

However, despite the extant data lending insight into public support for space activity, scholars agree that more research is needed to better understand what specific sectors of the public want. Generally speaking, well-educated, Republican males with higher socioeconomic status can be expected to support space programs as an issue public (Whitman Cobb 2011, 236-38), but in the US, support for space activity is far from universal. Using polling data collected from the 1960s to the 1990s, Launius shows that while the political motives behind the Apollo missions were unique (2003, 175), even during the 1960s Americans were questioning how important spending resources on spaceflight endeavors was, compared to remediation of issues like pollution and poverty (166). Indeed, the only time that Apollo's achievement justified its expense with more than half of those polled (53%) came at the time of the Apollo 11 Moon landing in 1969 (167). More recently, Whitman Cobb found that despite tendencies of survey respondents to overreport

measures like their own knowledge of a topic, 42% of participants in a national survey reported knowing "little to nothing" about commercial space activities (164, 175). Broadly, she determined that while knowledge about commercial space increases support for commercial human spaceflight, significance for other identity-based support predictions was mixed (174).

The well-acknowledged gender gap for support for space exploration (men favoring this more than women) grew in the 1980s, but has been shrinking in decades since (Whitman Cobb 2020, 2). While massively complex and pervasive cultural beliefs about the different gender roles of women and men contribute to the much lower percentage of women trained/working in STEM fields, legal and educational trends have been opening opportunities for women since the second half of the 20th century (e.g., Civil Rights Act of 1964) (3). Whitman Cobb found that scientific literacy, gained from college-level science courses, is an important predictor for increased female support for space exploration spending, even more relevant than for men (6), who are generally more influenced by implicit attitudes regarding science (1). Thus, different methods are required to increase levels of support between men and women; following other studies, both youth and adult education meant to erode negative stereotypes about women in STEM, and simply increasing the amount of women working in scientific/space fields, are suggested to reduce the gender gap (7; Whitman Cobb 2020, 175). Regardless of positionality, Americans believe space conflict is more important to prevent than "boots on the ground" Earthbound warfare, with the most knowledgeable respondents indicating particular concern about potential space debris in a conflict scenario (Martin et al. 2023). These findings, in concert with the theoretical models describing the intensity of support for space expansion among certain bases, demonstrate that more research specifically seeking to reveal ideas about space expansion is deeply needed.

III. METHODS

To examine 21st century attitudes toward NewSpace expansionist endeavors, I collected in-person ethnographic data between April and May 2025 working with 33 visitors to the Henry Crown Space Center of the Griffin Museum of Science and Industry (MSI) on Chicago's south side. This venue was selected because museums with exhibits on spaceflight, such as the MSI, are recognized as places where space exploration aficionados congregate and reinforce a space enthusiast group identity (Launius 2013, 59). Due to the unlikelihood of museum visitors self-identifying with the academic "space expansionist" label, recruitment questions were centered upon themes of future habitability and the usefulness of space to Earth (Deudney 2020, 30). Therefore, I approached prospective participants in the Space Center, asking them questions like "Do you think humanity should expand into outer space? Is going to space a good idea for us?". If met with a positive answer, from "yes, absolutely!" to "yeah, but it depends on…" then I asked if they would be willing to share their thoughts with me. Participants were tasked with completing a 17-question survey, and could take part in an optional card sort testing their confidence in various technopolitical alternatives across six fields. I designed the card sort to utilize concepts adapted from Deudney's own model (2020, 48), maintaining ideas and organization but rephrasing versions for clarity and ease of personal identification. For each field, respondents were asked to select the option with which they agreed the most out of those given; the cards were reshuffled after each instance to provide a random order.

The survey administered a mixture of multiple choice and free response questions, generating both quantitative and qualitative data, while the card sort generated a series of coded numbers. Methods of analysis therefore included both investigation of numerical trends and coding of qualitative content, each providing more detail when cross-tabulated with gender and age (by

decade born). Additionally, I conducted an interview with a senior exhibition developer for the Space Center. This interview provided more qualitative contextual information regarding the Space Center's programming, and what developers hoped visitors might learn from it. This study thus juxtaposes perspectives from institutional representatives with those of patrons, examining the role of the MSI – with its cultural authority of an educational edifice – in shaping public viewpoints on outer space from both sides.

IV. FINDINGS & ANALYSIS

The Griffin Museum of Science and Industry's Henry Crown Space Center – New and Improved

Before examining the opinions and attitudes of my respondents, I will briefly sketch an outline of the exhibit they came to visit which served as my data collection space. In 1986, the MSI opened the first version of its Space Center, in a building primarily constructed to hold the nearby Giant Dome Theater. It was updated in 2007, but the 2008 recession frustrated plans for a more ambitious redesign planned at the time. Then, the 2020s presented new opportunities for revitalization. One of the first acts of then-new CEO Chevy Humphrey (2021-present) was to arrange a deal with SpaceX for one of their Dragon cargo capsules, now a magnet piece which finds good company among MSI's prior Apollo holdings while providing contrast between the older artifacts and its sleek modern design. The extant exhibition opened its doors in May of 2024, focusing on more relevant storytelling that showcases the collaborative nature of space accomplishments in addition to the "cool" allure of mission-tested technology. This collective quality to scientific and technological advancement in space reaches into the past as well as the future, as demonstrated both through installations like a 1992 prototype garment and biofeedback belt worn by Dr. Mae Jemison, first American woman of color in space, and a space career tree,

showing what interests and skills might fit certain space-adjacent jobs (e.g., space environmentalist, flight suit designer, etc.). The exhibit's programming takes care to show visitors what the benefits are *back on Earth* of what is learned in space, in my view attempting to bridge the gap Schwartz et al. (2023) identify between those already "in" space and generalist museum-going public audiences by highlighting the relevance of distant outer space to a visitor's own Earthbound life. Thus, it works to *situate* space within broader contexts of human progression (I use this in a chronological, not teleological, sense), drawing in audiences with disparate interests.

When asked about the "big ideas" of the exhibit, a senior developer told me that the Space Center is meant to inspire, to show people the enormity of what is possible – like safely going to the Moon and back – when thousands of people from all fields of expertise cooperate to further a common goal. He noted that for museum visitors who are "hungry for new optimistic stories," "space can be a *tabula rasa*" upon which these can be projected, leaving room for both information and hope to be imparted upon museumgoers. To illustrate this idea, he cited MSI's signed copy of Apollo 8's *Earthrise* photograph as an example of an artifact that generates the awe-inspiring, unifying feeling the exhibit seeks to instill. According to this developer, another contributor to the human-centric orientation this exhibit has is an element of "reflected knowledge," whereby we Earthlings can learn more about our planet and ourselves through learning about the universe. Thus, outer space programming at the Museum represents a highly salient example of what is nonetheless a very "human story," and that the Sagan-esque concept that curiosity and exploration are innate in humans runs through this exhibit bolsters this feeling of inspiration. By complicating traditional "maverick astronaut" narratives popular during the Cold War to include those who, while instrumental to space achievements, have largely been left out of such heroic stories, the Henry Crown Space Center of 2025 "resonates with people" more, and seeks to fulfill the social

demands of a modern audience better than its previous forms.[2] As such, it – and the vision of spacefaring it shares – represents an opportunity not just to learn about space but to speculate and imagine about science, technology, and the limits and possibilities of modernity itself.

MSI Visitors – Whose views are here represented?

This paper can proceed no further without an explicit characterization of the participants whose opinions will be analyzed in the following pages. First, while the museum audience members with whom I spoke are also members of "the public," they cannot fully represent this latter category. This is because what we might call the space expansionist *clergy* – policymakers, space billionaires, venture capitalists, etc. – also constitute part of the public; therefore, the *laity* I attempt to sample must be tightly contextualized within the non-expert, museum-visiting population they are able to represent. Second, while this research was designed to investigate people who would be considered space expansionists per Deudney's definition, just by dint of personal rather than professional stakes in the concept, this is not what occurred. To be blunt, I did not find even one person in my sample whom I would say conforms to all ideological expectations which a traditional space expansionist would meet, and thus do not make the claim that my data represents lay space expansionist thought. However, this is not to say that I found no attitudes parallel with a space expansionist perspective, or that I cannot relate such trends to previous and/or future research directions.

Therefore, the ensuing analysis will impose a division between viewpoints captured in the study, oriented around the axis of their relation to the model of space expansionism put forth in *Dark Skies*. The first will concentrate upon what I call *acriticality*, the set of beliefs which align

[2] Summative evaluation has not yet been performed for the Space Center, so these claims were informed by more informal encounters and impressions rather than data collected from visitors.

with space expansionist desire without seriously considering or addressing drawbacks serious enough to warrant curtailing of expansion. The second, encompassing *critical* perspectives, will do the opposite, examining views of the same topics covered in the first but through the lens of this consideration of drawbacks, demonstrating critical engagement with present and potential programs of space expansion. Thus, departures from an "acritical" expectation do not then represent a debunking of Deudney's book (indeed the opposite), nor necessarily a refutation of claims in the literature that space expansion enthusiast spaces tend to be insular, allowing no room for criticism of their ideals. Examples of this phenomenon can be found in Taylor's characterization of SpaceX CEO Elon Musk's devoted supporters – his "'cultish' fandom of Musketeers" (2022, 71) – or the Weinersmiths' running depiction of "space geeks" in their pop-science book, *A City on Mars* (2023, 27, 288, 316, 400-01), and certainly in Deudney's assertions about space expansionists' thought processes (2020, 35). What my data does indicate is that there are many more regular people, *not* space expansionists but nonetheless interested in and supportive of spacefaring futures, who do not seem to be adequately represented either by experts and leaders in the space industry (23), or by (qualitative) scholarly literature on public reception of and imagination about space expansion. Therefore, the respondents in my sample represent people interested enough in human space presence to visit a museum exhibition with a pedagogical emphasis on this topic, but their enthusiasm does not reach the level of Launius' space gospel or Deudney's radically transformative, "cosmically ambitious" space expansionism (2020, 217).

For some people, space represents a locus of opportunity whose promised rewards for near- and/or long-term benefits outweigh the risks it presents. For others, space is off-limits until more of what they see as Earth's most pressing problems – e.g., climate change, social inequalities – are sorted out. The element of unquestioning optimism about space in the former view above

constitutes our acriticality, more consistent with Deudney's characterization, while the pessimistic emphasis on the potential of "failure" in the second serves as our body of critical thought about humanity and what we might do in space. Here, "failure" is less a concrete label for a certain outcome: the concept of space expansion as a whole is not like a single mission, where if the engine burns and the rocket flies, it is a success, while if it explodes on the pad, it fails. Rather, in developing the poles of a/criticality, what people seem to construct as "failure" shows more about their expectations for success, where they place the threshold for a cost-benefit analysis that determines the use of space. Recalling STS engagement with sociotechnical imaginaries (Jasanoff & Kim 2015), the contrast between the implications about the present unveiled through exploration of a spacefaring future between space expansion advocates and those more critical of it is here revealed in different ways.

Transitioning now away from the theory of space expansionism and toward the more empirical qualities of my overall sample, the participants in this study first developed an interest in humans going to outer space reacting to an array of different influences. Most respondents became intrigued about the idea of humans going to space early in life, with almost 60% having developed this interest in childhood and another quarter becoming curious about the concept as a teenager. People from a mixture of genders and ages fell in line with this pattern, though some of the influences they identified shifted over time between those growing up in the midst of the government-led Old Space era versus the commercialized NewSpace of the past 15 or so years. The most frequent influence people identified for this early interest was media they had seen, encompassing movies, books, TV shows, games, and the like, with two in three people mentioning it as one of a few or the primary cause of their interest. Bingaman et al., studying the effects of science fiction viewing, news media use, and social media use between 2016 and 2021 found that

science fiction viewing, most especially to do with space, was the most significant predictor tested for positive space exploration support (2022, 6). Thus, media being the most influential factor on spacefaring interest among my sample follows their claim that portrayals of space exploration in sci-fi may influence support for both governmental and private space exploration in real life (5).

After media, the next most common influences respondents reported were lessons from school and news coverage; the combination of these indicates that information and narratives about human spaceflight and expansion have been present in "the culture" since at least the 1950s. This nebulous reference to "culture" here maps broadly onto the scientific and creative conventions of dominant American cultural stories and associations (for example, science is "integral to progress but also dangerous" (Bingaman et al. 2022, 2); humans are explorers (Sagan 1994, 6); America expands (Kilgore 2003, 10-11; Rubenstein 2022, 134)). However, it also implicates US foreign relations (e.g., Muir-Harmony 2020, 219-22), since media is the one influence shared across all five of this study's non-American respondents who became interested in human space presence early in life. Additionally, some older participants noted the unique conditions surrounding the Cold War-era space race as influences upon them as children, whether they were invested in what they heard or simply remembered how present talk of space activity was then. For example, one American woman born in the 1950s recalled how "space was everywhere in the 1960s," so it was difficult to avoid hearing about it – though she was also an avid science fiction fan, devouring sci-fi books and watching episodes of the original Star Trek show. Likewise, a man from England remembered growing up alongside the Space Shuttle program, and seeing Ronald Reagan, president of the USA during most of the 1980s, often talking about space travel.

Respondents also reported utilizing a range of methods to explore their interest in human space presence and expansion in the present. Given the nature of the data collection site, over 80%

of respondents agreed that they liked to learn about space at museums and/or planetariums. Many people also indicated enjoying reading books and articles, as well as watching videos or documentaries and listening to podcasts about space, thus showing engagement with multiple learning styles and sites. However, when asked whether the Griffin Museum of Science and Industry's exhibit programming shaped or changed their ideas and attitudes about space, only one in five attested that it had, with the majority reporting neutral influence. Therefore, summative evaluation, when done by the Museum, will lend future insight into which elements of the Space Center's exhibition and programming impact visitors' attitudes.

On Humanity – A Glimpse in the Mirror

Determining whether humans *should* go to space is a very different question than surmising whether we *can*, if our technological capacity is sufficient to transport living creatures past the Kármán line and back. We know the latter is possible: in addition to hundreds of human beings, we have already facilitated journeys to the stars of a wide range of Earth life, including mammals, birds, insects, fish, amphibians, plants, and bacteria. Instead, the value judgements necessary in determining whether humans "should" go to space, or the extent to which we should go, make this a thorny ethical question. They draw in concerns about who goes and who does not, what those who go do while there and their motivations for such actions, and what resources will be spent to render possible such passage (Nesvold 2023).

When asked whether humans are ready to embark on space expansion now, technological considerations aside, respondents created an impressively uniform bell curve of distribution. A dozen participants fell in the middle, indicating that it would depend on some factor(s) they had in mind, with six each agreeing and disagreeing with the idea that humans are ready as we are. As for those who felt the strongest about the issue, three strongly disagreed, while four strongly agreed,

tipping the scales just slightly in traditional space expansionism's favor. Men were significantly more likely than women to believe humanity ready for space expansion, comprising 66% of those who agreed, with older males constituting 100% of those who strongly agreed. Females, often younger women, constituted 75% of those who suggested it would depend on some external set of conditions, like how and why space expansion would be designed and executed.

Some respondents within my sample offered rationales for their answers to this question more sympathetic to an acritical, space-expansion-friendly mindset, putting a certain amount of conceptual distance between Earthbound and supraterrestrial activity despite the purposive connection between the two. For example, among the explanations given by participants who most strongly believe humans already prepared for space expansion was the idea that the scientific and cooperative nature of living in space would serve as a common goal to unite humankind. These men, all born decades apart, agreed that "Earth issues" will never be fully solved, so to wait for some perfect time far in the future deprives human society holistically of nearer-term technological benefits. And this is not just an American viewpoint: a man from England suggested that "the answers to saving our planet could be in the stars [or] on another planet," indicating that his concern for the Earth – and humans' responsibility for addressing dangers to it – coexists with his desire to see expansion beyond it. This sentiment stands as a representative for the slightly larger pool of respondents indicating milder agreement with the idea that humans are currently ready. These participants indicated that they felt human expertise and interest have enough depth and breadth to accommodate both Earthbound and spacefaring life, meaning that foundations can be set now for a future society in space without taking away from contemporary, non-space-related issues. If "technological advancements and cultural issues can be reasonably managed exclusively and independently," as one man born in the 1970s wrote, then it is easy to see how, from this

perspective, space expansion can be construed as a net benefit for both today's and tomorrow's humans. For the acritical, per the above framing regarding "failure," this projected benefit is the salient potential hanging in the balance, wherein *not* expanding and taking advantage of what space has to offer threatens humanity's success.

However, more people with an interest in human space presence believed that humankind has more work to do before embarking on an expansion project than these optimists above. Climate change was frequently invoked as a reason to ground lofty dreams before takeoff, with especially younger respondents implying condemnation of the anthropogenic causes of climate change. One man from the Netherlands pointed to a deeper issue at the root of what decides for him whether humans are ready: while we might be capable of constructing the technology which would facilitate space life, "if we cannot take care of the Earth, I think we still got a lot to learn before we can successfully expand." This comment highlights the tension between what knowledge humans hold and how we choose to apply it, an issue which concerns more than just the eco-minded. An American woman born in the 1960s wrote succinctly of the issues she sees in the application of knowledge gained from space: she was "not sure the info would be used wisely or for good." Another set of respondents concentrated on the moral realm, finding that uncertainty in geopolitical power relations and the complex emotional and ethical thought which they feel must go into space expansion deliberations would behoove more thorough and intensive preparations before beginning in earnest. Therefore, these respondents' criticality focuses on the tension at the heart of the model of the troubled present and the techno-modernist future. They report taking issue with some of the qualities of modern, industrialized Earth life, but they do not locate their solutions in a future in space where those issues have all somehow simply been made obsolete, a thing of the barbaric past.

Straying even further from an acritical following of space expansionism, nearly 30% of the sample believed humans are not ready for expansion at all. For these respondents, Earth issues are more important than space futures, and more attention should be paid to the former before making room for the latter. Climate change was still present as an undercurrent, but the most salient concerns people identified here had to do with social relations between humans. For example, a non-binary respondent in their 20s indicated that "humans need to learn about how our habits [impact] our planet before we use similar habits on other planets," and a "lack of consideration on current issues" like climate change and social inequality hamper our readiness. In another critique of Earth life, a Mexican woman in her 20s wrote that "the fundamental issues of sustainability, equity, and conflict resolution" have not been satisfactorily addressed; to expand into space without resolving these deficiencies would be irresponsible. Demonstrating engagement with the consequences of space expansionist "exit narratives," which position Earth as a diseased, unsalvageable place humanity must soon leave, an American woman born in the 1990s wrote that the exclusive nature of space expansion privileges those with the resources to leave Earth over the rest of the planet. Since "only [a] certain amount of people will be able to go to space as expansion," she wrote, there would be "less means and want from higher powers to save the [Earth] as it is." In this perspective, if Earth as it is needs saving, better to do so now, rather than ruin space in the same ways and create a cosmic cascade of already-identified (and thus preventable) problems.

Furthermore, elements of distrust in leadership emerged from this faction, with multiple respondents casting doubt onto space expansion agendas. An American man born in the 1960s reported that he would feel more trusting if the organization(s) arranging space expansion were more transparent about their motivations, rather than hiding self-serving ambitions. An American

woman of the same age range criticized the destruction permitted by profit-seeking behavior, writing explicitly that she does not condone space expansion "until the pendulum swings in a direction where we as humans understand the requirement to preserve and not profit." In these examples, the rationales behind space expansion would have to change a great deal, being both formulated and articulated differently, to provide a framework of space expansion these respondents would support. Thus, among the camp less or not enthusiastic about space expansion, the idea of "getting along on Earth," as an American woman born in the 1950s summarized, comes first. This group's criticality on this subject, then, is based on their interpretations of issues present in modern Earth life, showing their desires for a better future without these issues via indications that a spacefaring future which retains or exacerbates them represents a failure.

Interest in Space Expansion, or Space Expansionism? – What do these museumgoers hope for humankind's future?

On an anthropocentric version of Sagan's Cosmic Calendar, if *Homo sapiens*' at least 300,000 years on Earth were compressed to a single day, then Gagarin's pioneering spaceflight in 1961 was just about 18 and a half seconds ago – this not even 17 seconds after the Wright brothers' first powered flight in 1903. The First Space Age moved fast, and the modern commercial NewSpace era moves even faster, with market competition and venture capital propelling technological innovation and proliferation of space actors beyond just governmental agencies (Vance 2023, 37; Deudney 2020, 121). This timeline, combined with the ideological inheritances of NewSpace from Old regarding emphasis on competition and progress, mean that for everyone alive today attuned to space happenings, there is a certain historical precedent informing an expectation for sustained advancement. However, the advances in outer space presence people wish to see in their lifetimes are varied; these variances indicate broader attitudes about space expansion, particularly how fast people would like to see it progress.

Beginning again with the acriticality of advocacy for space activity, my data suggest a gendered element to more fervent support for space expansion, where in general, men have higher hopes than women for more significant leaps and bounds in near-future space presence. Tables 1.1 and 1.2 illustrate this claim more specifically: on average, the men in my sample were interested in seeing more steps toward greater space presence during their lives than women, with more favored advancements on the average male respondent's list than for his average female counterpart. Among the listed options,[3] men reported more interest in a wider range of space activity, suggesting a higher degree of support for what Deudney calls *habitat space expansionism* (2020, 30). Meanwhile, the women in my sample tended to report wanting to see fewer space advances in their lifetimes. The options they supported were more limited to exploration and temporary travel, indicating a higher degree of support for the reserved goals of a *planetary protection* expansion program instead (ibid). Thus, the expected pattern of men favoring more space activity than women (Whitman Cobb 2020, 2) is here borne out, but further detail is required to analyze the nuances of a/criticality not only across gender, but within singular responses.

Among women, the most favored space advancements reported were the arrival of humans on Mars and the launching of more exploratory probes, fitting with the "cooperative" and "information-centric" lean of planetary protection expansion (Deudney 2020, 30). Arrival on Mars was the most controversial advancement for female respondents, with 75% of rankings seeing it either at the top of the list or excluding it entirely. Younger women (born in the 1990s or later) tended to look forward more to arrival on the Red Planet, and only two of the women with Mars

[3] "Advancements" here simply indicate greater levels of space presence than at present: Establishment of a permanent moon base; arrival of humans on Mars; establishment of human colonies on Mars; industrial manufacturing moved off-Earth; launching of more unmanned scientific and exploratory probes, like the James Webb Space Telescope; establishment of a US military base in space; launching of more manned stations, like the International Space Station (ISS); functioning of universal communication satellites, accessible from anywhere on Earth; and launching of a manned expedition out of the solar system.

arrival as a top choice, both in their 20s, ranked a Mars colony's establishment in the top half of their lists. Overall, women viewed the development of more manned stations like the ISS, or universal communication satellites connecting all of Earth, slightly more favorably than men, suggesting with their focus on extant technology that a female view of the future of space is more restrained and perhaps more realistically achievable. Among men, the most frequent top choices for space advancements were the establishment of a permanent base on the Moon and the launching of a manned expedition out of the solar system. Beyond these, men were more likely to support heavy industry and manufacturing being moved off-Earth, demonstrating an interest in more intense development of spacefaring technology and an accelerated timeline for space expansion compared to women. Next, the most controversial advancement among men was the establishment of human colonies on Mars, with the same amount of people (four) excluding it from their lists as had ranked it second (three) or first (one). Of these latter four, only one was American, indicating at least in a preliminary fashion multinational male support for more long-term expansion to Mars. Taken together, the greater technological distance which humans of today have from the achievements the men of my sample would prefer to witness indicates both a greater male desire for a more traditional "living and working in space" conception of space expansion, as well as for steps toward this goal to be taken sooner and more quickly. In keeping with this gendered divide, analysis of card sort answers indicates that the men of this sample felt more techno-optimistic than women, reporting less skepticism about technology alongside more positive associations with and more transformative predictions about its effects on humanity and society. However, these results are to be taken as a product of their time and place, unable to suggest any sort of essentialist division between male and female experiences of the world.

Table 1.1: What advances in outer space presence do you wish to see in your lifetime? Female									
	Moon base	Mars arrival	Mars colony	Indus. not on Earth	More explor. probes	US mil. base	More mann. (ISS)	All Com Sat	Mann. leave solar
F 1950s USA	2	X	X	X	1	X	3	4	5
F 1950s USA	5	X	X	4	1	X	3	2	X
F 1950s USA	X	X	X	X	2	X	1	X	X
F 1950s USA	1	6	4	X	2	X	5	3	7
F 1960s USA	X	1	X	X	2	X	3	4	X
F 1990s USA	3	1	7	2	4	X	6	5	X
F 1990s USA	6	1	X	7	3	X	4	2	5
F 1990s USA	X	X	X	X	4	X	3	1	2
F 1990s Mexico	5	6	8	3	1	9	4	2	7
F 2000s USA	2	5	X	X	1	X	4	3	6
F 2000s USA	3	1	2	6	X	X	4	5	7
F 2000s USA	3	1	4	2	7	5	9	6	8

Table 1.2: What advances in outer space presence do you wish to see in your lifetime? Male									
	Moon base	Mars arrival	Mars colony	Indus. not on Earth	More explor. probes	US mil. base	More mann. (ISS)	All Com Sat	Mann. leave solar
M 1950s USA	3	4	2	6	7	8	5	9	1
M 1950s USA	2	4	5	3	6	X	7	1	X
M 1950s USA	1	X	X	2	4	7	3	6	5
M 1960s USA	3	5	7	6	2	X	4	1	8

M 1970s England	3	1	2	6	5	X	7	8	4
M 1970s USA	1	3	4	X	6	X	2	7	5
M 1970s USA	1	3	X	X	5	X	4	2	X
M 1990s England	2	X	X	1	5	X	6	3	4
M 1990s USA	5	4	8	6	2	X	3	1	7
M 1990s Dutch	3	5	2	4	6	9	7	8	1
M 2000s USA	X	4	X	5	1	X	2	6	3
M 2000s France/ Peru	3	2	1	8	6	X	7	4	5

Table 1.3: What advances in outer space presence do you wish to see in your lifetime? Non-binary

	Moon base	Mars arrival	Mars colony	Indus. not on Earth	More explor. probes	US mil. base	More mann. (ISS)	All Com Sat	Mann. leave solar
NB 2000s USA	X	1	X	X	5	X	4	3	2

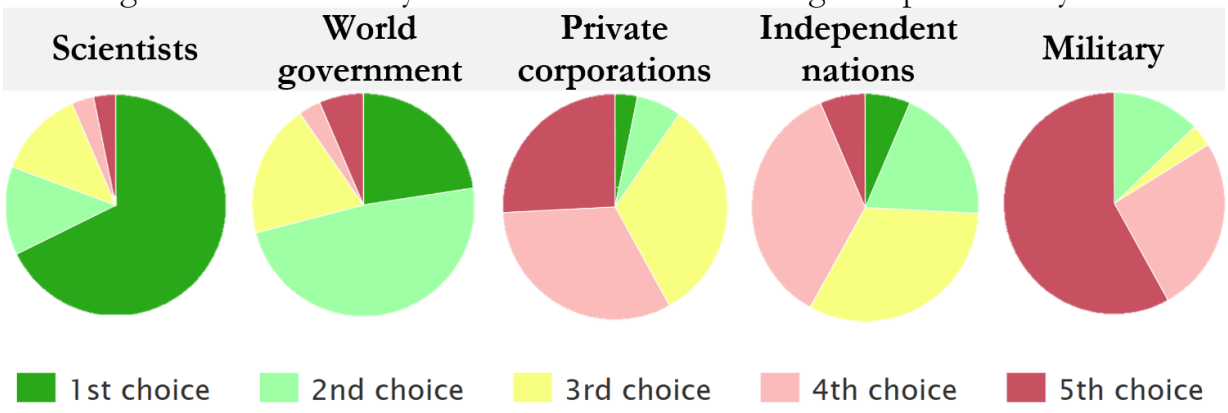
Useful though it is to reveal these trends, gender is not an infallible predictor for support for space activity, and some members of all genders sampled demonstrated criticality in addition to the more enthusiastic support just covered. In looking at the options which women excluded from their lists entirely, the greater amount of red X's in Table 1.1 than 1.2 suggest a paucity of broad female support for the more ambitious projects of space expansion in the near term. For example, half the women who answered this question did not want to see the O'Neillian concept of zoning space for heavy industry coming to fruition, indicating a lack of approval for the normalization of industrial activity in space. And older women (born in the 1960s or earlier) especially tended to hold lukewarm opinions on a manned mission leaving the solar system,

bolstering the claim that (rapid) space expansion's lack of desirability among women indicates less female alignment with the eagerness of habitat space expansionism (Deudney 2020, 11, 30) from both of my analytical poles. Despite the men of my sample giving the impression that they envisioned a future with more perpetual and normalized involvement in space, they did exclude many options from their lists, though they agreed less than women did among themselves about which options were least desirable. To illustrate, most men ranked arrival on Mars in the top half of their lists, but this option was overall ranked lower than the establishment of a Mars colony, an advancement which would necessarily come after arrival. Next, fewer men than women opposed a Mars landing mission, but they felt less strongly about it as a whole, with only one man from England listing it as his top choice. Men were also less enthused about exploratory probes than women. None excluded it from their lists but instead, apart from one first choice and two second, they ranked probes' development consistently in the middle or toward the bottom of their desired advancements. Thus, criticality in this respect once again throws into relief what people believe humanity has to gain or lose from expanding into space or remaining Earthbound. Here, men tend to construe the opportunity cost of planetary protection expansion at habitat expansion's expense as more of a failed future, while women tend to find success in smaller, more gradual – or more restrained – steps.

Finally, the establishment of a US military base in space was far and away the most opposed advancement by all genders represented. Most frequently, this option was excluded entirely. In the few cases in which it was not, it was the lowest-ranked choice, with only two people deviating from this pattern: a man born in the 1950s, and a woman born in the 2000s, both American. The uniformity of this response among my sample indicates widespread opposition to overt extension of state militarization into outer space. Following the theory, this uniformity suggests that both

planetary protection and habitat space expansionism are far more popular than military space expansionism, even among acritical advocates for the former two programs of the amplification of human presence throughout outer space (Deudney 2020, 30). However, it does not address attitudes regarding the realities of near-Earth space already being thoroughly securitized (Peoples & Stevens 2020, 294-95); future research should investigate such links between worlds.

Figure 1: Who would you most want to see in charge of space society? All



Next, looking even further ahead than a lifetime, I asked respondents to consider who they would want in charge of space society, from a list including scientists, a world government body, private corporations, independent nation states, and military organizations. Tables 2.1, 2.2, and 2.3 demonstrate the rankings by gender; contextual reasoning for these rankings was not collected, so acriticality must be inferred with less specificity here. To begin, respondents across age and gender lines tended to agree about their top two choices. Scientists and world government bodies took the lead (Figure 1), with about 68% of the sample selecting scientists as their first choice, and another 23% ranking world government bodies at the top of their lists. Half as many men ranked scientists first as women, and all but one of the six respondents who ranked scientists as their third choice or lower preferred a world government body the most. The support seen here for these two categories indicates that the concept of a technocracy holds at least some appeal for an imagined

space society, perhaps in part due to the way the morals and imperatives of science – and scientists – are constructed in the popular eye (Bingaman et al. 2024, 22).

However, even the support for various leadership structures generated by this question indicates more about criticality, to which I now turn. Since world-government bodies were the most popular option after scientists, and neither of these social collectives can be said to currently be leading the NewSpace charge, we can surmise more disgruntlement with the present as compared to the imagined future. The options that correspond more to the reality of space activity in the 21st century, where self-interested independent nations and purely profit-driven private corporations are the leading entities in the space industry, were tied for the most popular third choice. Broadly, men were more interested in seeing independent nations in charge of space society than women, with 87.5% of the female sample ranking this option at third or below while about 36% of males ranked it second or higher. One American man each listed private corporations as his first (born in the 1970s, second choice military) and second (born in the 1950s, first choice independent nations) choice, and one American woman listed it as her second (born in the 2000s, first choice scientists). Other than these, it consistently scored toward the middle or bottom (over 50% fourth rank or lower) of respondents' lists. These opinions regarding private corporations in particular are ripe for researchers to target: when Whitman Cobb asked in a survey for respondents' agreement with the statement, "Human spaceflight generally is best left for private companies, like SpaceX and Blue Origin," 42.8% responded "neutral," while 32.1% (strongly) disagreed to 25% (strongly) agreeing, suggesting that Americans do still see a role for governmental actors in space (2023, 171). And while not captured in this study, Bingaman et al. found that political ideology was a significant predictor for support of private space exploration, with conservatives significantly more likely than liberals to be in favor of privately funded space travel (2022, 6).

Lastly, the most popular fifth choice, or put differently, the least favored option for space society leadership among this sample, was that of military organizations, again showing a lack of support for military space expansionism. With nearly 60% of respondents – proportionally equal across gender lines – ranking military leadership in last place, a spectrum of trust in various institutions emerges, demonstrating where the most intense collective criticality lies. For example, private corporations were the second most popular last choice across the whole sample, with about 27% of participants ranking this beneath military organizations. Older respondents (born 1970s or earlier) were a bit more likely to indicate more favorable attitudes toward military leadership in their lists; one American woman born in the 1940s indicated that her interest in human space presence stemmed from her being a military wife. However, women born in the 1960s or earlier were more likely than younger women (born 1990s or later) to rank private corporations last. While answering another question, a man born in the 1960s provided a comment on how he determines trustworthiness. While he ranked military organizations fourth and private corporations last, he indicated that open acknowledgment of the reality of military leadership engenders more trust than shadowy governmental or private agendas, writing: "At least with the Space Shuttles, the military and NASA did not hide that many early Shuttles missions were military in nature." Taken in concert, these data and trends indicate that while my lay museum audience was generally critical of the military, older generations have more trust in military leadership than younger ones. Affiliation to military organizations was not collected as a demographic measure, but preliminary results here suggest also that people with a closer connection to the military might share this greater trust. They also indicate that any patterns following the quoted man's thought process, whereby military involvement in space activity might have garnered trust among people who grew up

during the First Space Age, do not seem to be borne out for the trust patterns of younger generations watching private corporations in the burgeoning commercial age.

Table 2.1: Who would you most want to see in charge of space society? Female

	Scientists	World gov.	Private corporations	Nations	Military
F 1940s USA	1	5	3	4	2
F 1950s USA	1	2	3	4	5
F 1950s USA	3	1	5	2	4
F 1950s USA	1	2	5	3	4
F 1950s USA	1	2	4	3	5
F 1960s USA	4	1	3	5	2
F 1960s USA	1	2	5	3	4
F 1960s USA	1	2	3	4	5
F 1990s USA	1	2	5	3	4
F 1990s USA	1	2	3	4	5
F 1990s USA	2	1	4	3	5
F 1990s Mexico	1	2	4	3	5
F 2000s USA	1	2	3	4	5
F 2000s USA	1	3	4	2	5
F 2000s USA	1	2	4	3	5
F 2000s USA	1	3	2	4	5

Table 2.2: Who would you most want to see in charge of space society? Male					
	Scientists	World gov.	Private corporations	Nations	Military
M 1950s USA	1	2	3	4	5
M 1950s USA	5	4	2	1	3
M 1950s USA	1	3	4	5	2
M 1960s USA	2	1	5	3	4
M 1970s England	2	1	4	3	5
M 1970s USA	3	5	1	4	2
M 1970s USA	2	3	4	1	5
M 1970s USA	1	2	3	4	5
M 1990s England	1	2	5	3	4
M 1990s USA	3	1	5	2	4
M 1990s Dutch	1	2	3	4	5
M 1990s Mexico	3	1	4	2	5
M 2000s USA	1	3	5	2	4
M 2000s France/ Peru	1	2	3	4	5

Table 2.3: Who would you most want to see in charge of space society? Non-binary					
	Scientists	World gov.	Private corporations	Nations	Military
NB 2000s USA	1	3	4	2	5

Beyond these given five categories, some respondents wrote in nominations for other various elements of Earth life, arguing for the contributions they would make by serving as a representative leadership figure.[4] One respondent took a distancing view, advocating for a more immediate independence of space society from Earthly affairs. Others were more invested: one woman took an explicitly feminist stance, suggesting that carrying on with current ideas of governance and who is fit to lead would result in a recreation of Earth problems in space. From her perspective, having women in charge "for a century or two" would provide a buffer period for such problematic attitudes to change, allowing for a more inclusive and thus stronger springboard for future space expansion. Similar to the concern she had that exporting present attitudes about the Earth would lead to humans "mess[ing] up" another planet, another woman championed environmentalism as the ethos of an organization she'd like to see in change of space society. For her, the profit-hungry behavior of humans willing to sacrifice our Earthly environment for short-term gains does not bode well for space expansion, and she took care to denounce pollution, colonization, and the exploitation of naturally occurring substances and landscapes *for profit*. These critical perspectives align far better with the holistic, ethically motivated visions of space found in Afro- and Indigenous Futurism, as discussed in the introduction, more than acritical space expansionism. And despite survey results from 2018 indicating that 72% of American adults believed it essential for the US to be a space exploration leader (Funk & Strauss 2018), nobody wrote in "the USA" or any variant, appearing to relegate any opinions about American space hegemony to the lukewarm views they provided on independent nations' leadership.

[4] One man recommended dogs as Terran ambassadors, suggesting that they would make better representatives than humans if encountering extraterrestrial life.

The final realm of a/criticality to be explored in this section has to do with whether – and if so, how – current *forms* of Earth life could be exported to life in space. Given that early space expansion will be a high-risk endeavor for those who embark upon it, many methods of social organization that are taken for granted on Earth will not apply in the same ways in outer space or on other celestial bodies. My data generated by this question allows for the introduction of another facet of acriticality altogether: that of the lack of prior engagement with the concept itself. When asked to ponder whether the type of criminal justice system involving punishments like imprisonment, monetary fines, and restricted movement could be used to order space life, a few discrete schools of thought emerged. Nearly half of the sample (about two thirds of these being women) indicated that they had not thought much about this issue before, the majority of these reporting that they simply had not encountered prior occasion to formulate an opinion about it. Brief comments like, "[Too] busy trying to navigate life here," and "This is [an] investing idea I have no real thoughts on," once again demonstrate the distancing effect between Earth and spacefaring life that has already emerged in acritical conceptions of expansion. Since all space presence observed so far has been temporary, with the idea always being to return to Earth after a short time, these respondents admit that looking at spending a lifetime in space would require much more thought about social organization, but since we are not yet at that point, it is a less pressing concern for them. Bringing acriticality in its most explicit form were the most idealistic respondents, who simply hoped that crime will become a thing of the past, not to be carried into the future by the more "highly evolved" specimens who will leave our planet permanently. One man traced his thinking along these lines to the heroic narratives surrounding astronauts which he consumed in his youth, remembering how it seemed that the "trailblazers heading [into] space are [heroes,] and [heroes] don't commit crimes!" Thus, in these examples, the differences between

temporal contexts seem to preclude continuity between the banal, regulated, grounded present and an imagined utopian future, filling in, but not explaining, the blanks between now and then.

This connection, however, was not denied but rather espoused by a different set of respondents, bridging the gap between nescience and critical engagement. About a third of participants agreed that Earth's myriad histories and customs would serve as the seed from which future spacefaring ways of life would germinate and adapt to unforeseen conditions. Across lines of gender and age, this set of respondents was concerned with the risks of maintaining national divides. Overall, they indicated that more equal opportunity access to space, a "unifying [Earthling] identity," and "less politics" would serve space expansion well. Another set of respondents rejected Earth life as a model for a spacefaring society, finding the differences between the environmental contexts of Earth and space an insurmountable obstacle. Four male respondents constituted a hands-off camp, suggesting that future space settlements should govern themselves autonomously, being allowed the independence to organically develop their own culture(s) and ways of administration. A few others emphasized the necessity of cooperation, asserting that the flaws in Earth's relevant legal systems need to be addressed and remedied here before they can be approved for launch. Inequality in application and treatment of certain social groups was the most salient issue identified among this set of respondents, but no explicit references to identity (e.g., race-, gender-, class-based discrimination) were made. One woman born in the 1960s took a more historical view, making the claim that "space colonization should not mimic the colonization on [Earth]." Her reference to colonization projects in human history suggest specific events, sets of relations, and legacies as cautionary lessons which we should learn well before expanding into space, lest we repeat destructive relationships and create similar problems on other planets. Most explicitly, two respondents, young American women both, suggested the *tabula rasa* conception

of outer space as an answer to this question. One woman, born in the 1990s, wrote that "space can be a new start for society to rethink the flaws in our current system," while the other, born in the 2000s, connected the need for a "fresh start of figuring everything out" in space to more specifically "how much is going on now economically." Despite the prevalence of literature which indicates space is often constructed as a clean slate for a reinvented society (e.g., Cockell 2015, 7; Deudney 2020, 42; Nesvold 2023, viii; Taylor 2023, 61; Weinzierl 2018, 174), and the orientation of the Space Center's exhibit portraying space this way, in my data these comments fall more in line with the trend regarding dissatisfaction with the present order on Earth with a concomitant inability to identify or suggest specific fixes which would address such anxieties.

However, while it is untrue that those respondents more well-informed about such topics were necessarily less supportive of space expansion, those with more prior knowledge did exhibit criticality via the specificity for their visions of how such expansion should be led. In support of Whitman Cobb's findings about greater knowledge correlating with increased support for space activity (2023, 174), analysis comparing my survey answers to card sort responses indicates that those more informed about space issues tend to be more optimistic about more technopolitically exuberant futures. Such respondents tended to report having greater confidence in science and technology, given adequate foresight and steering, but they found these most positively operational within particular contexts of social organization. The judicial system elements which respondents tended to find appropriate for a space context had to do with the broader style of behavioral influence achieved by such a method. For example, one woman nominated an Anglo-Saxon *wergild*-like system for space society, where the labor of a wrongdoer would be compelled to "make up" for the harm they had perpetrated. For her, restorative justice is apt for an outer space context, as it allocates resources to rehabilitation and reformation, helping both perpetrator and

victim to move productively past a criminal act. A man in his 20s took the opposite tack, making a case for deterrence theory to be applied "with more severity" than in Earth contexts. He espoused that sanctions, even for minor infractions, should be "exaggerated" to dissuade disorderly behavior and orient individuals around the collective cause of survival. The matter of imprisonment was up for debate, with a few respondents falling on either side of this theoretical divide. Early on in a space expansion project, as one respondent born in the 1950s surmised, the option might remain to send space criminals back to Earth. But what if this were not possible, or indeed different governing authorities planetside disagreed about the legality and/or proper consequence of a particular case? Some respondents thought, as in the first case, that physical restriction in an inhospitable space environment would be too impractical when weighed against its social value. Yet others, as in the second case, voiced concerns about the safety of the majority, wondering what but imprisonment could protect a settlement from someone who had for some reason become violent. Thus, while some respondents either were not concerned about apprehensions of justice in space society or could propose a model which they were confident would solve likely issues, others' opinions fell more in line with the pessimistic spirit of Deudney's conclusions regarding space expansion, namely that humans cannot be trusted with it (2020, 7). Here, then, even critical *advocacy* for space expansion finds a narrower threshold for success than acritical support, as the path between the Earthbound present and spacefaring future is constructed as more of a whitewater rapids than a well-paved straightaway.

V. CONCLUSION

"The very young do not always do as they are told," commented wise Nox father Antaeus in a sly aside to Earthling Colonel Jack O'Neill, protagonist of sci-fi series Stargate SG-1, as they searched the forests of Gaia for Antaeus' missing son. Ostensibly an observation explaining why

the boy did not flee danger that O'Neill had warned him about, this quote also captures a critique of humanity's immaturity and unpreparedness for learning the ways of technologically superior alien societies (like the Nox). With these words, Antaeus's character is not only making a historical argument about trajectories of technoscientific development, but a civilizational one regarding humans' Goffman-esque performance of identity production relative to the show's alien species. He is telling O'Neill that the *human* way is not the *only* way (Stargate SG-1 01.08, 01.17). Scientist and experimental astronaut Commander John Crichton, protagonist of cult sci-fi show Farscape, is told something similar by the Ancients, an immensely powerful shapeshifting race looking for a hospitable planet. With energy enough to transport themselves only once, they delve into Crichton's mind to investigate how Earthlings might react to an alien encounter, rather than simply showing up on humanity's galactic doorstep and hoping for the best. By making Crichton believe he and his thoroughly alien friends are back on Earth, the Ancients watch as John's friends are quarantined and separated, and how one is killed and dissected. While our hero acquits himself well as a friend to aliens, the Ancients learn not all humans would do the same, and rule out the possibility that Earth might be their "welcoming place" – but leave Crichton with approval: "If all people were like you, maybe it could be" (Farscape 01.16).

These self-reflexive criticisms from the realm of late-1990s sci-fi TV demonstrate human anxieties about which of our social tendencies (here, being accepting and cooperative versus nearsighted and pugnacious) might best define our species-wide conduct. They also help us complicate our conceptions of space expansionism, showing an alternative view of beyond-Earth presence where desires for a bigger place in the universe coexist alongside doubts that the teleological, techno-optimistic space expansionism with which Daniel Deudney takes such issue (2020, 7) is the best way forward. The early 21st century's transition from the government-led,

bureaucratically slow-and-safe Old Space of the Cold War to the competitive, innovation-leading-regulation style of the commercially dominated NewSpace in which we are now embroiled presents an opportunity for necessary reckoning with the ways in which we imagine the future. Despite the ideological similarities between NewSpace and Old – like extreme techno-optimism and frontierism – the exponential proliferation of private actors with their arms reached skyward constitute a significant practical difference between the two eras. Thus, the "for all mankind" ethos which ostensibly led the American pioneers of Apollo 11 (Muir-Harmony 2020, 235) and the writers of the foundational yet outdated 1967 Outer Space Treaty (Caffentzis & Federici 2014, i95) can no longer be claimed with the same confidence. As Rubenstein points out, corporations' primary concerns are their stakeholders' profit, not "benefit[ting] humanity," and the proliferation of private agents in the space industry is poised to deepen already-staggering wealth inequalities even more (2022, 157-58).

This change is important both in spite of and *because* I was not able to locate the full degree of acriticality among lay space expansion aficionados I set out to find. Utopian depictions of spacefaring futures espoused by prevalent space expansionists of corporate NewSpace, in combination with the space expansionist focus on the technological rather than social facilitation of such imaginaries, implies that space enthusiasts are all go for launch. However, my data indicate that public opinion, inasmuch as it can be represented by the nonexpert yet interested museum attendees whom I studied, is more nuanced than extant literature takes into account. Some respondents did indeed display acritical support for expansion. For some, this was because they hadn't thought much before about the myriad obstacles in the way of successful spacefaring, while for others, it was because the way they defined this success allowed them to skirt or mitigate these obstacles. Yet I also found much critical engagement with the concept. Among these critical

perspectives, my analysis indicates, is a dissatisfaction with many patterns of modern Western capitalist life. In this way, principles such as social equality, sustainability, and environmentalism lead the way to a successful future, and given the already-universal risks posed by our inability to achieve these properly on Earth, space expansion becomes something to sideline rather than prioritize. In addition, since women tended to favor the more restrained program of planetary protection space expansion, focusing on exploration and temporary presence, while men tended to prefer the more ambitious habitat space expansionism, a gender divide (to say nothing of other demographic measures) shows fundamental disparities in how humans today envision both the present and future. However, either way, such beliefs lend valuable insight into a lay public's views about science, technology, and the role of the development of these for how humans will live for generations to come. They may not indicate a technophilic, self-assured, quasi-religious space expansionism, but nonetheless they illuminate and bring nuance to our understanding of how Earthlings think about space expansion today.

The comparison of my respondents' thoughts, hopes, and worries with the unfolding reality of the NewSpace era allow me to recommend a series of prescriptions. First, at the very least, to prepare for the scientific, supranational government system respondents here favored, contemporary governments and employers should work together to recruit people from underrepresented and diverse backgrounds into STEM fields, and collaborate more on space exploration initiatives to foster goodwill and develop techniques for more ambitious missions in the future. And corporations, while the innovation which market competition has recently brought to space technology is undeniable, should take a breath and reassess *broader public* demand for their products and services; according to many of my respondents, expansion into space does not need to proceed quite so quickly. Overall, my findings work to confirm and back up the warnings

of the authors of *Reclaiming Space*, who worry that the disconnect between the will of the many and the arguments of those space experts Deudney execrates as the dangerous sort of space expansionists is cleaving further in twain (Schwartz et al. 2023, xii), threatening to leave the majority of people behind.

However, taking another step back, the entire program of space expansion, whether for advancing habitat, military, or even planetary protection infrastructure and presence in outer space, has been at a point for some time now where it requires intensive interrogation before proceeding any further. If all humanity collectively participates in this examination of cost versus benefit, we may decide that we imagine our successful future to lie in space, or we may not. But if we do, and if all Earthlings – or even just all humans – are to be equally respected and represented by the society we might aim to build in space, much more research, education, and integration of interdisciplinary leadership must be accomplished first. The grave and tyrannical consequences of space expansionism's hubris, as laid out by Deudney (2020, 136, 149), mean that matters which could at least indirectly impact everyone on Earth throw much weight behind the claim that the opinions captured here should be taken seriously in "space spaces," up to and including in policy. The limitations of the present study provide a simple starting point for this future research. To begin, due to a combination of a small *n* and restrictions within my data collection context, I was not able to gain insight into the demographic trends and effects of race, education level, or political affiliation, all measures which previous research indicates are influential over space beliefs (e.g., Bingaman et al. 2022, 2024, 33, 35; Whitman Cobb 2011, 2020, 2023; Martin et al. 2023; Launius 2003; Kilgore 2003). Early in his book, Deudney writes that "[m]any arguments of space expansionists are space-political arguments, about the broad political consequences of space," and that extant political science analysis has mostly focused on cause rather than effect of space activity

is a problem he argues must be rectified (2020, 28). Beyond this, future research should also explore more intensely the evolving realm of space ethics (e.g., Szocik 2022; Nesvold 2023). Just as the failed yet valuable Biosphere II experiment (Rubenstein 2022, 143-44) should be repeated to ascertain the practical feasibility of a self-contained Earth life system *before* such a project is piloted on another planet, the methods and contingencies of proposed social organization systems should be well-tested antecedent to their application in space. If the gaps in understanding and perspective between those who are already present in areas of authoritative knowledge production about outer space and the rest of the planet can be bridged, then it is much more likely that we can all welcome a spacefaring future where we are Earthlings first, and everything else second – that is, if we don't decide to leave a sustained life among the universe beyond Terra solely to science fiction.

VI. BIBLIOGRAPHY

1. Barela, Valentina. 2023. Space Colonization: Which Regulations and in Whose Interests? *Italian Law Journal* 9(2): 727-744.
2. Bingaman, James, Wyatt Dawson, Paul R. Brewer, Ashley Paintsil. 2022. Media Use and US Attitudes Toward Government and Private Space Exploration. *Space Policy* 62 101506.
3. Bingaman, James, Erin Oittinen, Aysha Siddika, Paul R. Brewer. 2024. Watch the Skies: How Science Fiction Viewing, Documentary Viewing, and News Use Predict Attitudes on US Space Initiatives. *Astropolitics* 22(1-2): 20-42.
4. Bjørnvig, Thore. 2013. Outer Space Religion and the Overview Effect: A Critical Inquiry into a Classic of the Pro-Space Movement. *Astropolitics* 11(1-2): 4-24.
5. Caffentzis, George and Silvia Federici. 2014. Commons Against and Beyond Capitalism. *Community Development Journal* 49(S1): i92-i105.
6. Cockell, Charles S. (ed.) 2015. Human Governance Beyond Earth: Implications for Freedom. New York City: Springer.
7. Cockell, Charles S. (ed.) 2016. Dissent, Revolution and Liberty Beyond Earth. New York City: Springer.
8. Crawford, Ian A. 2022. Brightening the Skies: Institutional Solutions to the Societal and Geopolitical Risks of Space Expansionism. *The Institutions of Extraterrestrial Liberty*, ed. by Charles S. Cockell. New York: Oxford University Press, pp. 119-139.
9. Dark, Taylor E. III. 2006. Reclaiming the Future: Space Advocacy and the Idea of Progress. *Societal Impact of Space Flight Conference, National Air and Space Museum*. Smithsonian Institution, Washington D.C.

10. Deudney, Daniel. 2020. Dark Skies: Space Expansionism, Planetary Geopolitics, and the Ends of Humanity. New York: Oxford University Press.
11. Dillon Grace L (ed.). 2012. Walking the Clouds: An Anthology of Indigenous Science Fiction. Tucson: University of Arizona Press.
12. Eriksson, Johan and Lindy M. Newlove-Eriksson. 2023. Outsourcing the American Space Dream: SpaceX and the Race to the Stars. *Astropolitics* 21(1): 46-62.
13. Farscape. 1999. "A Human Reaction," ep. 1x16, directed by Rowan Woods, written by Justin Monjo. Aired August 29, 1999, on the Sci-Fi Channel.
14. Funk, Cary, Mark Strauss. 2018. Majority of Americans Believe It Is Essential That the U.S. Remain a Global Leader in Space. *Pew Research.* June 6. https://www.pewresearch.org/science/2018/06/06/majority-of-americans-believe-it-is-essential-that-the-u-s-remain-a-global-leader-in-space/ (accessed 4/19/2025).
15. Goswami, Namrata and Peter A. Garretson. 2020. Scramble for the Skies: The Great Power Competition to Control the Resources of Outer Space. Boulder: Lexington Books.
16. Haraway, Donna. 2016. A Cyborg Manifesto: Science, Technology, and Socialist-Feminism in the Late Twentieth Century. In *Manifestly Haraway*, ed. by Donna Haraway. Minneapolis: University of Minnesota Press.
17. Jasanoff, Sheila. 2015. Future Imperfect: Science, Technology, and the Imaginations of Modernity. In *Dreamscapes of Modernity: Sociotechnical Imaginaries and the Fabrication of Power*, ed. by Sheila Jasanoff and Sang-Hyun Kim. Chicago: University of Chicago Press.
18. Kennedy, John F. 1962. Address at Rice University on the Space Effort. September 12. *Rice University*. https://www.rice.edu/kennedy (accessed 6/26/2025).

19. Kilgore, De Witt Douglas. 2003. Astrofuturism: Science, Race, and Visions of Utopia in Space. Philadelphia: University of Pennsylvania Press.
20. Klimburg-Witjes, Nina. 2024. STS and Outer Space: Extending the Gaze. In *The Elgar Encyclopedia of Science and Technology Studies*, ed. by U. Felt and A. Irwin. Edward Elgar Publishing, pp. 562-568.
21. Latour, Bruno. 1981. Visualisation and Cognition: Drawing Things Together. In Knowledge and Society Studies in the Sociology of Culture Past and Present, ed. by J. Kuklick. Jai Press 6: 1-40.
22. Launius, Roger D. 2003. Public Opinion Polls and Perceptions of US Human Spaceflight. *Space Policy* 19: 163-175.
23. Launius, Roger D. 2013. Escaping Earth: Human Spaceflight as Religion. *Astropolitics* 11: 45-64.
24. Martin, Johnathon, Michael Dodge, Shayne Daku. 2023. Public Opinion of Space Warfare: A Survey and Analysis. University of North Dakota. https://newspaceeconomy.ca/2023/08/22/report-public-opinion-of-space-warfare-a-survey-and-analysis-und-2023/ (accessed 11/18/2024).
25. Marino, Alessandra. 2024. Technologies at 'the Edge of the World': Outer Space, Global Inequalities and the Promise of Progress. In *The Sage Handbook of Global Sociology*, ed. by Gurminder K. Bhambra, Lucy Mayblin, Kathryn Medien, Mara Viveros-Vigoya. London: Sage Publishing.
26. Marshall, Alan. 1995. Development and Imperialism in Space. *Space Policy* 11(1): 41-52.
27. Masco, Joseph. 2012. The End of Ends. *Anthropological Quarterly* 85(4): 1107-1124.

28. Nelson, Peter Lothian and Walter E. Block. 2018. Space Capitalism: How Humans Will Colonize Planets, Moons, and Asteroids. London: Palgrave Macmillan.
29. Nesvold, Erika. 2023. Off-Earth: Ethical Questions and Quandaries for Living in Outer Space. Cambridge: MIT Press.
30. Newell, Catherine L. 2014. Without Having Seen: Faith, the Future, and the Final American Frontier. *Astropolitics* 12(2-3): 148-166.
31. Olson, Valerie. 2019. Into the Extreme: U.S. Environmental Systems and Politics Beyond Earth. Minneapolis: University of Minnesota Press.
32. Peoples, Columba, Tim Stevens. 2020. At the Outer Limits of the International: Orbital Infrastructures and the Technopolitics of Planetary (In)Security. *European Journal of International Security* 5: 294-314.
33. Rubenstein, Mary-Jane. 2022. Astrotopia: The Dangerous Religion of the Corporate Space Race. Chicago: University of Chicago Press.
34. Sagan, Carl, 1994. Pale Blue Dot: A Vision of the Human Future in Space. New York: Ballantine Books.
35. Szocik, Konrad. 2022. The Bioethics of Space Exploration. Oxford University Press.
36. Schwartz, James S.J., Linda Billings, Erika Nesvold (eds). 2023. Reclaiming Space: Progressive and Multicultural Visions of Space Exploration. Oxford University Press.
37. Shammas, Victor L. and Tomas B. Holen. 2019. One Giant Leap for Capitalistkind: Private Enterprise in Outer Space. *Palgrave Communications* 5(10): 1-9.
38. Simpson, Sid, Désirée Weber, and John McMahon. 2024. Towards a Critical Space Theory: The Instrumental Politics of Space Exploitation. *European Journal of Political Theory* 0(0): 1-23.

39. Skran, Dale. 2024. Critique of "A City on Mars" and Other Writings Opposing Space Settlement. *National Space Society Space Settlement Journal,* December 2024: 1-90.

40. Stargate SG-1. 1997. "The Nox," ep. 1x08, directed by Charles Correll, written by Hart Hanson. Aired September 12, 1997, on Showtime.

41. Stargate SG-1. 1998. "Enigma," ep. 1x17, directed by William Gereghty, written by Katharyn Michaelian Powers. Aired January 30, 1998, on Showtime.

42. Starkey, Ryan. 2021. How a coastline 100 million years ago influences modern election results in Alabama. *Starkey Comics*. November 6. https://starkeycomics.com/2021/06/11/how-a-coastline-100-million-years-ago-influences-modern-election-results-in-alabama/ (accessed 7/23/2025).

43. Symes, Aliyah Gabriell. 2022. The Great Space Race(ism): How Science Fiction Predicted the Future—and How Afrofuturism Could Negate It. Master's thesis, UCLA.

44. Taylor, Sarah McFarland. 2022. "F*ck Earth": Unmasking Mars Colonization Marketing, from Planetary Perceived Obsolescence to Apocalyptic "New Earth" Rhetoric. *Journal of Religion, Media and Digital Culture* 11: 54-84.

45. Tavares, Frank, Denise Buckner, Dana Burton, Jordan McKaig, Parvathy Prem, Eleni Ravanis, Natalie Treviño, et al. 2020. Ethical Exploration and the Role of Planetary Protection in Disrupting Colonial Practices: A Submission to the Planetary Science and Astrobiology Decadal Survey 2023-2032. Cornell University, *arXiv*. https://arxiv.org/abs/2010.08344 (accessed 12/4/2024).

46. Treviño, Natalie. 2020. The Cosmos is Not Finished. PhD dissertation. The University of Western Ontario. https://ir.lib.uwo.ca/etd/7567 (accessed 12/4/2024).

47. Turner, Frederick Jackson. 1894. The Significance of the Frontier in American History. December 14. Address at 41st meeting of the State Historical Society of Wisconsin.
48. United Nations Office for Outer Space Affairs (UNOOSA) with processing by Our World in Data. 2025. Dataset. https://ourworldindata.org/grapher/yearly-number-of-objects-launched-into-outer-space (accessed 6/26/2025).
49. Vance, Ashlee. 2023. When the Heavens Went on Sale: The Misfits and Geniuses Racing to Put Space Within Reach. New York: HarperCollins.
50. Weinersmith, Kelly and Zach Weinersmith. 2023. A City on Mars: Can We Settle Space, Should We Settle Space, and Have We Really Thought This Through? New York: Penguin Press.
51. Weinzierl, Matthew. 2018. Space, the Final Economic Frontier. *Journal of Economic Perspectives* 32(2): 173-192.
52. Weinzierl, Matthew, Brendan Rosseau. 2025. Space to Grow: Unlocking the Final Economic Frontier. Boston: Harvard Business Review Press.
53. White, Frank. 1987. The Overview Effect: Space Exploration and Human Evolution. Reston: American Institute of Aeronautics and Astronautics, Inc.
54. Whitman Cobb, Wendy N. 2011. Who's Supporting Space Activities? An 'Issue Public' for US Space Policy. *Space Policy* 27: 234-239.
55. Whitman Cobb, Wendy N. 2020. Stubborn Stereotypes: Exploring the Gender Gap in Support for Space. *Space Policy* 54, ID 101390.
56. Whitman Cobb, Wendy N. 2023. Public Opinion of Commercial Space Exploration. *Astropolitics* 21(2-3): 164-178.